MOUNTAIN PINE BEETLE

IDAHO DEPARTMENT OF LANDS

State Forester Forum

Life Stages and Development

The mountain pine beetle, Dendroctonus Ponderosae Hopkins, is a small black beetle, approximately 3/16 inch in length, that attacks and kills pine trees in large numbers. During its one-year life cycle it passes through egg, larval, pupal, and adult stages (Fig. 1).

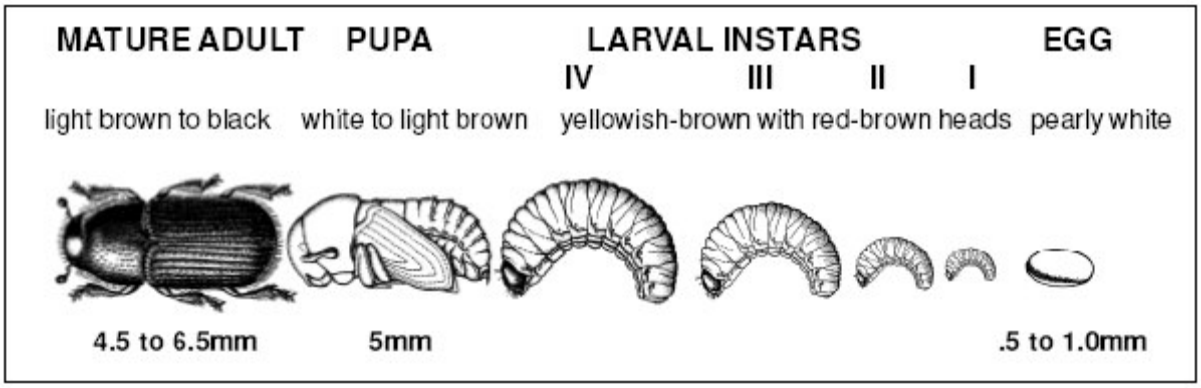

Figure 1. Life stages of the mountain pine beetle

All life stages are spent under the bark of infested trees except for a few weeks when adults emerge and fly to attack new trees during July and August. The adults bore through the outer bark, then chew out a fairly straight egg gallery, extending 10-30 inches up the tree in the soft inner bark (Fig. 2).

Pearl-white eggs about the size of a pin head are laid along the sides of the galleries and hatch in about two weeks. The **larvae** are legless, white and have small brown heads. They feed in the inner bark chewing out galleries that extend at right angles to the egg galleries (Fig. 2). Feeding continues until cold temperatures cause dormancy. The following June, when fully developed, the larvae change into **pupae**, which then develop into **adults**.

Approximately one year after the initial attack, the new adults chew through the bark and fly to attack new trees.

As the new adults emerge, they pick up spores of a blue stain fungus which they carry to the newly attacked trees. Once a new attack is started, the fungus grows into the water conducting tissues of the new tree, plugging them, and assisting in killing the tree.

Signs of Attack

The first sign of infestation by the mountain pine beetle is the appearance of **pitch tubes**, 1/2 to 3/4 inch across, which usually form at the entrance holes in the bark during the summer of attack (Fig. 2). They are composed of pitch mixed with boring dust and are usually widely scattered over the trunk of the tree indicating a massive attack. The next symptom will be **fading needles** which turn from green to yellowish green, to red, and finally, approximately one year after the initial attack, to rusty brown.

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Insect and Disease

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Hosts and Management Options

The main hosts of the mountain pine beetle are **lodgepole pine, ponderosa pine, and western white pine.** They also attack other pines including white-bark, Austrian and Scotch pines.

Lodgepole Pine

Outbreaks in lodgepole pine normally occur in mature to over-mature stands at low elevations. Thus, storing these trees on the stump should be discouraged. Management plans for pine stands of this nature should include considerations for the mountain pine beetle.

Long-term management is best achieved by changing stand characteristics. Harvesting of susceptible lodgepole pine is the most efficient management tool. In Idaho, high risk stands are those that are:

1. At an altitude of 6,500 feet or lower.
2. Have an average stand age of 80 years or older.
3. Have an average tree size of eight inches DBH or larger.
4. Have an inner bark thickness of one-tenth inch or greater.
5. Near populations of beetles in the area.

Reducing the average age, average tree size or tree density reduces overall stand susceptibility. This can be accomplished by harvesting or thinning operations. Patch cutting in lodgepole pine stands creates a variety of age classes that helps keep mountain pine beetle caused tree mortality low.

Short term control of the beetle is accomplished in two ways:

1. Synthetic reproductions of natural chemical messengers (pheromones) produced by the beetles can be used to attract and trap the mountain pine beetle. If a harvest is planned, standing trees can be baited with pheromones, enticing the beetles to attack. After they are attacked, trees can be cut and hauled from the site for processing that destroys the beetles. (Repellant pheromones are also being developed.) .
2. Preventive sprays of insecticides can provide two years of protection where tree value warrants the treatment. Carbaryl is commonly used for mountain pine beetle control.

Ponderosa Pine (Bull Pine)

In Idaho, stands with a high potential for attack are 80 to 100 years old, single-storied, with an average DBH of 10 inches or greater, and are fairly dense. **Basal area,** which is the sum of the cross-sectional area of all the trees on an acre, is also used to express bark beetle hazard. A basal area of 150 square feet or higher would be a high risk; 80 to 150 square feet, constitutes a medium risk; and less than 80 square feet is a low risk stand. As a general rule, a stand that has been thinned to 100 square feet of basal area per acre is considered to be fairly beetle resistant.

Western White Pine

Attacks of the mountain pine beetle on western white pine may occur alone or in combination with the incidence of white pine blister rust. Beetle management is obtained through management of the blister rust. Heavily infected trees should be cut. Rating systems to determine the hazard to white pine from the blister rust are available and can serve as a guide for management of this tree.

Protecting High Value Trees

For high value trees, such as those found in yards or recreation sites, the chemical pesticide carbaryl is registered and available to protect trees from attack. If there is a threat of attack of pines by the mountain pine beetle, carbaryl (Sevin®) can be applied before the beetles attack, protecting the trees for up to two years. The spray should be applied according to label instructions.

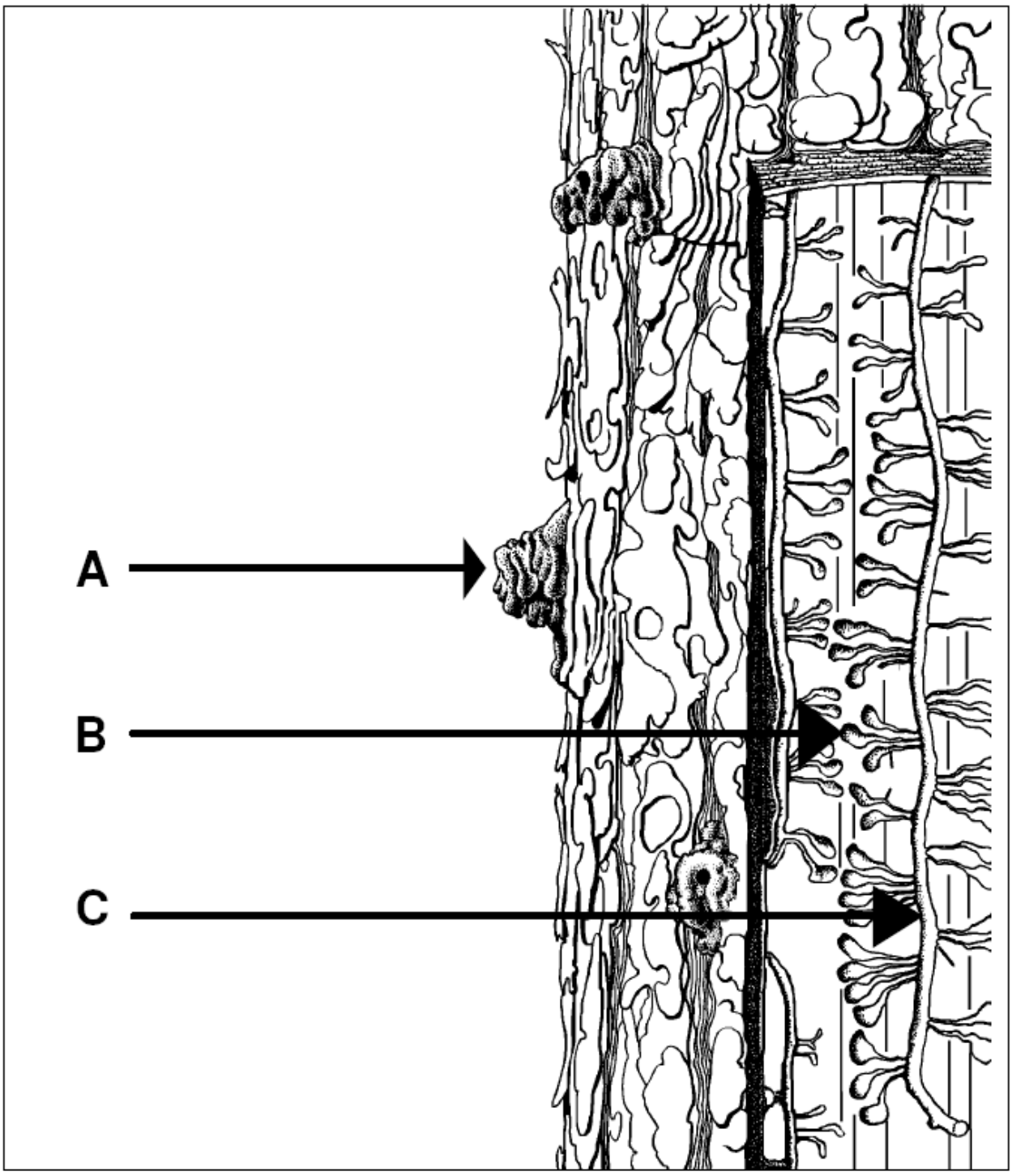

Figure 2. Mountain pine beetle in lodgepole pine
A - Pitch tube on trunk
B - Larval gallery
C - Egg gallery

Selected References

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